



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

Valentine, Elizabeth & Stewart, Glenn (2013) Director competencies for effective enterprise technology governance. In *Proceedings of the 24th Australasian Conference on Information Systems (ACIS 2013)*, RMIT University, Melbourne, VIC.

This file was downloaded from: <http://eprints.qut.edu.au/63374/>

© Copyright 2013 Elizabeth Valentine and Glenn Stewart

The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

DIRECTOR COMPETENCIES FOR EFFECTIVE ENTERPRISE TECHNOLOGY GOVERNANCE

Elizabeth Valentine
Information Systems School
Queensland University of Technology
Brisbane, Australia.
Email: elizabeth.valentine@qut.edu.au

Prof. Glenn Stewart
Information Systems School
Queensland University of Technology
Brisbane, Australia.
Email: g.stewart@qut.edu.au

Abstract:

In relation to enterprise technology governance (ETG), opinions differ between there being no need for board of director involvement to there being an urgent need for such involvement. This research highlights the need for boards to provide ETG oversight of technology-related strategy, investment and risk, and to be competent in doing so. We identify a large gap between board's awareness of the importance of ETG, their taking action and the competency requirements for effective ETG. Further, while there is considerable research and literature about operational IT governance frameworks and operational IT competencies, there is no known research into the specific competencies boards of directors need to effectively govern enterprise technology. This research focuses on and develops a board-level ETG competency set using a mixed methods approach within a recognised competency development framework. Further development is tracked using a rigour scale to demonstrate a medium to high level of competency validity for the derived set. This research contributes to practice by providing the first known industry validated ETG competency set situated within new and emerging technology. It contributes to the body of knowledge in the modification and application of competency development and competency validation frameworks not previously applied to the role of board director.

Keywords

Keywords: enterprise technology governance, digital directors, board technology competencies.

INTRODUCTION

Until recently boards of directors may appear to have done well in governing enterprises without IT expertise among their ranks. However, as the demise of Eastman Kodak shows, despite being a global, technology and innovation-based company, they went out of business primarily because they did not keep up with technological change. This example raises the question of the future role of boards of directors in effectively governing enterprises in a technology-saturated society and business environment. It highlights whether boards have the enterprise technology knowledge, skills and experience – or competencies (Markus et al. 2005) – to effectively govern this fast changing aspect of how both public and private sector organizations operate in the digital economy. Based on this identified board ETG competency gap, our research focuses on one research question: What generic competencies are required for effective board of director enterprise technology governance? To date we have not been able to identify a board-level ETG competency set. Thus the derived competency set is intended for use to evaluate, recruit and develop company directors. We focus solely on the role of board directors in ETG, because of the importance and impact of the board's competence and capability in relation to firm performance (Parent et al. 2009). We first introduce industry and scholarly literature leading to an updated definition of board level ETG as distinct from management level IT governance. We then outline our methodology and findings, concluding by providing a derived set of three ETG competencies: 1) governing technology for competitive advantage and business performance; 2) making quality technology-related judgements and decisions, and; 3) overseeing technology use to achieve returns and demonstrate value. We demonstrate a medium to high level of rigor (Schippmann et al. 2000) in this competency development process. Finally we highlight the contribution, limitations of and opportunities for further research in this topic.

Literature review

Since business computing took off in the 1980s and with the increasing sophistication, convergence and capacity of information and communication technologies, awareness that board directors need to engage in information technology governance has grown significantly in recent times (e.g., Andriole 2009; Huff et al. 2006; ITGI 2011; Masli et al. 2011; Van Grembergen et al. 2012). Boards of directors have increasingly come under scrutiny and regulation (Buckby et al. 2010). Increasingly, all organizational stakeholders, be they public or private sector, expect their enterprises to be governed competently to derive value from technology-related capital investments and asset utilization, and to manage risk (Ho et al. 2011). Competency based approaches suggest value comes from identifying the competencies needed for improved performance (Marrelli 1998). However, improving performance is difficult when strategy matching competency requirements are not clear or in evidence (Leblanc et al. 2005) including within the board of directors. As well, board-level governance, key to organizational oversight, conformance and performance monitoring and accountability (ISO/IEC 2008), is also changing (Yusoff et al. 2012). In part this is because of technology.

Fox et al (2006) find that sociologically, the rise of technology in all its forms is presenting unique problems for those who govern. They suggest that the complex characteristics and features of a mobile and internet-enabled world have the potential to significantly change and reshape balances of power between states, corporations and individuals. This is evident in the rise of both the technology-savvy, informed consumer and the in demand for closer scrutiny of governors in the past decade (Buckby et al. 2010). Fox et al (2006) also suggest, the information age will subvert existing forms of governance, creating the need and the potential for new forms.

Based on these concepts, the rapidly changing landscape and cognizant of the technological complexity that boards now need to understand and deal with Valentine et al. (2013) suggest a new range of ETG skills, knowledge and experience are required by board members as well as non-IT executives. It is also suggested that reviewing all board competency requirements be contextualized by the rapid rise, business use and convergence of mobile devices, cloud-based technologies, big data and social media (Rheingold 2012). This now pervasive nexus of technologies and technology-enabled ways of doing business is an important context for current and future corporate governance across all competency domains: finance, legal, human resources, marketing, operations and technology, as recently borne out by Harvey (2013). He suggests it may be a 'fatal view' to ignore the impacts of technology across all business disciplines (including the law) because of the level of continuing disruptive and radical technology change occurring, and because there is 'no finishing line for technology or the internet' (Harvey 2013, concluding remarks). Perhaps one explanation for boards' reluctance to take a greater role in ETG is because definitions are confusing.

Valentine et al. (2013) suggest that this confusion may be because the term 'IT governance' forms part of most current ETG definitions. They suggest that this possibly perpetuates notions of technology governance being an operational, IT department matter rather than a strategic and thus board accountability. They suggest competencies should be contextualized by the nexus of new and emerging technologies because of the speed that digital opportunity and risk occur. They also suggest an updated definition retains a sense of the strategic, integrative and aligning aspects of an enterprise-wide view, and helps to clarify governance roles:

Enterprise Technology Governance is an integral part of board governance. It includes the leadership, alignment and oversight of enterprise technology with the organization's strategy, structure, performance planning and monitoring systems, policies and governance processes. ETG creates value by optimizing stakeholder engagement and investments, and deriving returns. It also seeks to facilitate data-driven decision making throughout the enterprise and to minimise risk. ETG supports the board in fulfilling its duty of care.¹

To reduce confusion we distinguish ETG and the board's role from IT governance and management's role:

IT governance is the responsibility of executive management and is an integral part of the overall enterprise governance and strategic planning system. It consists of organisational structures, governance frameworks, policies and processes that ensure that the organisation's IT sustains and extends the organisation's strategies and objectives, and minimises risk. Through management reporting about technology-related investment opportunities and risks, the board is able to monitor IT and its governance against plan, and to oversee risk.²

In keeping with our focus on and definition of ETG, indications are that board competency (Andriole 2009; Parent et al. 2009; Yusoff et al. 2012) and IT maturity (e.g., ITGI 2011; Luftman et al. 2012; Nolan et al. 2005) need to underpin the technology-related questions boards ask of management. Competency is critical to overall board performance because a board's combined knowledge, skills and experience drive decision quality, their

¹ This definition builds on various common definitions including ITGI (2011).

² The definition of IT Governance acknowledges discussion with Murray Wills of Maxsys, Wellington NZ.

actions and priorities (Martyn 2006). Understanding IT maturity is important because when decisions are made from a basis of understanding technology dependence, boards are better able to decide whether they should take a more aggressive stance (Nolan et al. 2005). However, while there is some research about IT competencies within organizations (e.g., Cragg et al. 2011; Tallon 2008) and a small amount about board competencies (Arensdorf 2012; Parent et al. 2009; Yusoff et al. 2012) none specify ETG board competencies.

RESEARCH METHOD

Exploratory and positivist paradigms were combined in a four-phased, mixed methods approach (Bryman et al. 2007) to develop and validate a set of building-block competencies. Because the research objective was to discover generic board-relevant ETG competencies, an adapted version of the Process Oriented Core Competency Identification (POCCI) model (Bai-Chuan et al. 2006) was used throughout all phases as the meta competency development-model. This model focuses on the theoretical impacts of strategic management and human resource development, making a process linkage between competency and competitive advantage - all relevant to the board's ETG role. The POCCI model required modification to apply to ETG competency and the generic role of board director, as it is usually used to identify core competency within a single organization. An internal focus and an emphasis on membership attributes rather than technical skills (Markus et al. 2005) were identified limitations of other competency modelling frameworks considered and subsequently rejected. POCCI uses a clustering and categorizing process (Bai-Chuan et al. 2006) akin to open and axial coding (Corbin et al. 2008). Similarly, in phases 1-4 of our method we used NVivo10, to open code, then apply qualitative content analysis (Bryman et al. 2007) and axial coding to capture and cluster the scant available sources. Combining POCCI and the Level of Rigour Scale (Schippmann *et al.*, 2000) helped improve the mixed- method research design and reduce common validity and relevance issues associated with unacceptable subjectivity levels in competency identification (Bai-Chuan et al. 2006) and in qualitative methods (Bryman et al. 2007).

Phase one, the literature review, explored the topic. This stage of open coding and capturing knowledge, skill and experience examples (Bryman et al. 2007) was challenging because most information sources including competency literature, related to operational IT management roles instead of the strategic, governance oversight role of boards in ETG. Using deeper content analysis combined with axial coding (Bryman et al. 2007) we determined that an enterprise architecture (EA) focus: Business architecture; Information / data architecture; Application / integration; and Technical / infrastructure (IEAD 2011) provided good representation of the emerging ETG themes. Thus the first competency set was developed under EA headings. These headings provided the open-coded data with the focus and structure of the strategic, overarching and integrating framework of EA (IEAD 2011) as a starting point. Next the process of drafting this first set was evaluated against Schippmann et al's (2000) 10 point scale to establish a basis of development rigour. Prior to conducting this check, as shown in Table 1 we situated rigour scale criteria among 'an array of contextual and practical variables that can impact decisions about the level of rigour that is most appropriate in a given situation' (Schippmann et al, 2000, pp. 731). Taking an epistemological position of relevance and meaning to the potential end users (Bryman et al. 2007) in this ETG competency development, impact variable considerations identified from the literature included: how the competencies will be used e.g., board evaluation, board recruitment, director professional development; conformance drivers, legislation and standards such as Sarbanes Oxley and ISO/IEC 38500; nexus technology impacts; and the number of roles covered. For example, this research focuses on a single, generic role of board director rather than further segmenting the role into executive or non-executive directors, considering the individual needs of a particular industry sector, or considering the use of the competencies with management. These criteria are reflected in Table 1 and in the competencies shown later.

Table 1: Schippmann et al's Table (2000, pp. 724)

Impact variables	Low/med rigour	Medium rigour	Med/high rigour	High rigour
1. Method of investigation	Multiple sources/ same method i.e., lit review	- ³	Multiple sources/mixed methods	-
2. Type of descriptor	-	Combo of 3 types of data used e.g., standards, journal articles & skill sets	Descriptors adjusted to reflect Marrelli (1998) format	-

³ A dash (-) indicates no action taken at this level or against this impact variable.

Impact variables	Low/med rigour	Medium rigour	Med/high rigour	High rigour
3. Procedures used for developing	Sole use of literature review as starting point	Discussion with available subject matter experts incl. online	Cross checks with qualitative inputs from temperature check survey	Cross checks with ISO 38500 & SFIA 5 standards for development rigour
4. Detail of descriptor	-	-	Precise categories established using coding devices	Detailed layers of description as per Marrelli (1998)
5. Link to business including gov' frameworks & competency uses	Effort applied via literature review where nexus technologies were identified	Effort applied via mixed methods to understanding unique board level roles & governance barriers in case study	Capability statements developed from qualitative inputs and temperature check survey.	Relevance to large corporate in case study: analysis of intact Gov. F'work & relationship to ETG.
6. Content review including nexus technologies & relevant standards	Initial review by research team & conference paper reviewers	Cross check against qualitative data from survey	Cross check against ISO/IEC standard 38500 and SFIA 5	-
7. User ranking of descriptors	-	-	-	-
8. Assessment of reliability	Discussion with available subject matter experts on research team	Validation of perceptions of importance via Temp. Check Survey	Cross checks with qualitative inputs from temperature check survey	Cross checks with standards for development rigour
9. Retention criteria	-	-	-	Multiple criteria met via use of POCCI model and NVivo10 coding
10. Documentation	Summary data and paper-based workings retained.	NVivo10 capture + coding rigour	Data capture from forums entered into NVivo10	-

Table 1 shows the progressive record of rigour improvement actions taken from developing the initial set in phase one (mostly low to medium rigour), through to the current version (medium to high rigour). After establishing the foundation competency set and base- line rigour scale, three additional phases tested the need for and rigour of the competency set. Phase two, a revelatory case study, involved semi- structured interviews within a single organization (Yin 2009). As well as gathering a similar range of data as the phase three survey, the case study provided the additional benefit of being able to analyse the intact governance systems and mechanisms including ETG (or their absence) within one of Australia's top 100 companies. Phase three development entailed a short online survey to provide quantitative data about perceptions of competency needs and about the importance of now having ETG competencies on boards. Both phases 2 and 3 provided qualitative data on what types of ETG competencies respondents believe boards need (or not). Phase four captured additional qualitative data from online governance discussion forums. Content analysis of phases 2 to 4 guided the refinement and improvement of the initial competency set through three further iterations. Phases 3 and 4 were also checked against ISO/IEC standard 38500 (2008), new literature to hand and competency suggestions obtained during the interviews and temperature check survey. Again these methods and outcomes were cross-checked against the rigour scale to ascertain any movement in levels of rigour and to improve the final draft competency set. Whereas the use of competency modelling and frameworks are common practice, and while rigour scale use is considered best practice in management competency development (Markus et al. 2005) we were unable to find any board competency development that used this rigorous process.

RESULTS: ENTERPRISE TECHNOLOGY GOVERNANCE COMPETENCIES

Participants: the case study involved interviews with two directors, the CEO and three executives from the same top 100 Australian company (6000FTE). There were 93 survey responses that came from 14 different industries with the largest number coming from the Telecommunications and Technology sector (19%). Organization size

ranged from sole traders up to 150,000 FTE. 85.86% of respondents came from small to medium enterprises with between one and 2499 FTE. Most responses were from Australia and New Zealand (70%), but there were also contributions from the USA, Canada, UK, Europe, Asia and Africa. An additional 82 participants from a research blog and LinkedIn forums brought total participants to 181. 86% were male.

The literature review revealed that only 1% of Fortune 500 companies report IT expertise within the board (PwC 2012a). Yet, in a number of separate surveys, more than 90% of senior executives and directors identify technology as important or very important to their businesses (Eisener-Ampler 2012; ITGI 2011; PwC 2012). In Gartner's (2012a) global survey, less than 16% of boards identify technology-relevant skills amongst their ranks, while WCD 2012 Board survey respondents ranked technology as the most substantial missing or insufficiently represented skill set of all board skills (Groysberg et al. 2012). This indicates that the gaps are large between the stated importance of business technology, actual board involvement in ETG and in boards having the right skills, knowledge and experience to effectively oversee technology strategy, use and risk and therefore to govern ETG. While we identified a number of publications that discuss IT governance competencies, as already raised, operational IT governance should not be confused with the duties and responsibilities of board-level ETG. While technology governance standards such as ISO/IEC standard 38500 (2008) and some of the SFIA 5 (2011) level 7 skills could apply to boards, our analysis suggests that they are very high level and often task rather than competency focused. Most are not contextualised by either the overarching duty of care role required of boards, or by the nexus technologies discussed earlier. In other words we were unable to discover a board-relevant ETG competency set for use in board evaluation, recruitment or professional development, the most common aspects of a competency approach and its use (Marrelli, 1998).

While the complete case study and online survey results are reported elsewhere, the case study showed that even though the organization had an elaborate corporate governance framework in place, IT was delegated to the IT department, and largely treated as an operational matter, leaving the company exposed to a range of potential IT-related competitive, financial, compliance and reputational risks (Parent et al. 2009; Valentine et al. 2013). As Van Grembergen et al. (2009a) suggest, boards can no longer afford to ignore or delegate enterprise technology governance. To test the impact of the identified gaps our survey sought to establish the board experience level and the strength of opinion about the need for ETG competencies. Results show 56.99% (n53) of respondents had held board positions, with the largest survey respondent group having held chairman roles 32.26% (n30). 74.42% participants strongly agreed (54.65%) or agreed (19.77%) with the statement 'it is now very important that boards include directors with IT governance knowledge, skills and experience among their ranks, so that they can ask the right questions of management and advisors'. 10.47% were undecided, 9.30% disagreed and 5.81% strongly disagreed.

The results also appeared to reveal a relationship between those who disagreed or strongly disagreed and an older age group. 10/13 respondents born between 1940 and 1959 disagreed with the importance of ETG. Within this same group, 11/13 had no IT-related education or qualifications, which possibly indicates a relationship between perceptions of importance, age and having little knowledge or skills in the strategic use of technology. All of this group had held board roles perhaps reflecting Leblanc et al. (2005) observations of entrenched thinking within traditional boards. While the ITGI (2011) found less than 16% of boards have technology skilled directors, there appears to have been a significant shift over a two year period with 36.47% of our survey respondent boards now having one or more directors with board level IT governance knowledge skills and experience. However, the largest industry group being telecommunication and IT might explain this, as also found in ITGI (2011) and PWC (2012).

The initial competency set was amended substantially as a result of the case study interviews and the qualitative data gathered in the survey. For example, consistent feedback suggesting the competencies needed to be in plain English and understandable to business people, resulted in the initial EA cluster headings being refined from an EA focus to three outcome-focused competency definitions, capability statements and descriptors, as shown later. After applying the findings and observations from the interviews and the survey, then cross-checking against the ISO/IEC 38500 standard, a further review and edit was conducted after analysis of the phase four industry forum discussions. After once again applying the Level of Rigour Scale, we assess that the competency set derived and reported demonstrates a medium to high level of validity (as shown in table 1).

The format of the competency set follows that outlined by Marrelli (1998). Each competency has been described in behavioural terms from the point of view of the ability, skill, knowledge or understanding a director needs to demonstrate. This active voice mirrors the SFIA 5 framework (SFIA Foundation 2011). While the focus of this research and the derived competencies are for board directors, case study comments suggest they might also be useful for non-IT senior executives, and aspiring directors.

Board competencies for effective enterprise technology governance - a competency set

Category: Enterprise Technology Governance.

Competency 1: Govern technology for competitive advantage and business performance.

Definition: Directs and governs strategy development, technology alignment, organizational planning and investment to maximise the competitive use of technology and enhance performance at all organization levels.

Capability statement: To maximise returns on technology investment, this organization understands its level of technology maturity and its capability at all levels. Technology is used for competitive advantage and operational effectiveness and the organization is led and governed accordingly. Current and future technology impacts and risks are comprehensively understood. Business and technology planning are part of a dynamic, interlocking system of strategy development, performance planning, monitoring and measurement. Enterprise technology governance policies and mechanisms are in place and measured for their effectiveness.

Descriptors:

- Skilled in business, environmental and competitive analysis including how industry sector and competitors are using new and emerging technologies (Bassellier et al. 2003)
- Knowledgeable about current and emerging business technologies and their potential to add competitive, customer and stakeholder value (Hoogervorst 2009; Van Grembergen et al. 2009b)
- Knowledgeable about and skilled in evaluating the level of technology dependency the organization has now, and may need in the future. (Ali et al. 2012; Luftman et al. 2012; Nolan et al. 2005)
- Knowledgeable about how to incorporate current and future technologies into the organization's business strategy, plan development and performance measures (Bassellier et al. 2003; ISO/IEC 2008; Luftman et al. 2012)
- Knowledge of the business processes that underpin peak performance and their relationship to enterprise business and information systems technology architecture (Hoogervorst 2009)
- Knowledgeable about enterprise technology architecture in relation to infrastructure investment to achieve the business goals of the enterprise (Hoogervorst 2009; ISO/IEC 2008)
- Experienced in selecting, implementing and monitoring enterprise technology governance mechanism effectiveness (Ali et al. 2012; De Haes et al. 2012a; Jewer et al. 2012)
- Able to oversee IT acquisition, implementation, maintenance and disposal to meet board's fiduciary, regulatory, compliance, ethical, contractual and legal obligations (Bart et al. 2010; ISO/IEC 2008)
- Understands the design and use of business technology performance scorecards. Knows what to measure and monitor and how interpret performance data against plans and policies to derive expected benefits, and ensure strategic intent is achieved (ISO/IEC 2008).

Competency 2: Make quality technology-related judgements and decisions.

Definition: Understands and uses information and data to evaluate, direct, monitor and analyse information provided by management, supply partners and advisors. Can ask probing questions and contribute to discussion to ensure that decisions about technology-related performance and risk oversight meet governance performance and conformance requirements.

Organization capability statement: This organization understands how information and data flows can be used for innovation and business improvement as well as for risk monitoring. This board expects people at all levels of the organization to use data to monitor and analyse opportunities and risk, especially in areas of high vulnerability such as high cost IT projects, and the business use of mobile technology, the internet and social media. As leaders, these boards expect data and information to underpin strategy development, performance planning, monitoring and board reporting, and to drive quality decision-making at all organizational levels.

Descriptors:

- Able to champion the strategic use of business technologies, and data and information use for decision-making (Bassellier et al. 2003; Bloch et al. 2012; De Haes et al. 2012a; Marchand 2005)

- Demonstrates an understanding of the technologies for identifying, tracking, mining and exploiting the data and information relevant to the organization's needs (Libert 2013)
- Knowledgeable about the unique issues associated with competitive advantage and IT user experience (Keller et al. 2012; Van Grembergen et al. 2009a)
- Able to evaluate risk to ensure the continued operation of the business (ISO/IEC 2008; Parent et al. 2009)
- Able to oversee the governance of IT acquisition, implementation, maintenance and disposal to balance risk with opportunity and to support retention of intellectual property and organizational memory (ISO/IEC 2008)
- Knowledgeable about information and data security, privacy risks and their mitigation (Bart et al. 2010; Hoogervorst 2009; Keller et al. 2012; Parent et al. 2009)
- Knowledgeable about how to glean intelligence from big data and translate the findings into business advantage (Keller et al. 2012; Libert 2013)
- Skilled in the design and use of technology performance scorecard measures. Knows what to measure and how to interpret performance data (ITGI 2011; Libert 2013; Van Grembergen et al. 2009c).

Competency 3: Oversee technology use to achieve returns and demonstrate value.

Definition: Understands and can provide oversight of technology-enabled product and service development, business process efficiency and stakeholder engagement.

Capability statement: This organization has the ability to derive product or service value through technology. The ongoing design of the enterprise technology system supports business process efficiency, service delivery and their ongoing improvement. They understand applications and their wide use. To meet the organization's current and future needs, they regularly evaluate and discuss current, new and emerging technologies for product, system, process, service and user experience optimisation.

Descriptors:

- Understands how to derive business value from technology investments (De Haes et al. 2012a; Ho et al. 2011; Masli et al. 2011; Mithas et al. 2012; Pérez-López et al. 2012; Van Grembergen et al. 2012)
 - Knowledgeable about or experienced in technology asset management to achieve expected returns (ISO/IEC 2008; Keller et al. 2012; Van Grembergen et al. 2009b)
 - Knowledgeable about system and infrastructure components such as software, applications and hardware and cloud-based services, and the implications, costs and benefits of their uses (Hoogervorst 2009; ISO/IEC 2008; Keller et al. 2012)
 - Experienced in the governance oversight of large scale IT project investments such that IT assets are acquired, implemented and monitored with risk and value balanced throughout (ISO/IEC 2008)
 - Evaluates industry trends in new and emerging technologies relevant to meeting business or industry needs (Bassellier et al. 2003; ISO/IEC 2008; Van Grembergen et al. 2012)
 - Knowledgeable about the use of mobile and social media in product and service delivery (Keller et al. 2012; Scott et al. 2011)
 - Experienced in technology cost optimization in product, system, process and service development to provide good returns on investments and assets (De Haes et al. 2012a; Ko et al. 2010).
-

DISCUSSION

Differences in opinion on the need for ETG competencies in board members may be a result of confusing definitions, entrenched thinking or an aging less technology-educated director population. At the strategic level of the enterprise, ETG differs significantly from operational IT governance in the same way that strategic and operational management differ. Nonetheless, a gap between the stated importance of ETG and boards taking action has been identified. However, the literature review demonstrated a growing call for the identification and development of appropriate ETG competency in boards. The role of the board in governing technology appears to be changing with increased compliance and closer scrutiny and it would also seem that the necessity to govern technology investment and risk at the enterprise level has become a part of the board's duty of care,

whether they realize it or not. A board's capability and competence can have a profound impact on whether the organisation has a culture that uses data and information for decision making and competitive advantage. Their capability also underpins whether the organisation realizes the value of technology investments (Marchand & Peppard, 2013) and effectively oversees risk (Parent et al. 2009). Without a good percentage of digitally-savvy directors, boards risk 'flying blind' (Carter & Lorsch, 2004). Conversely with a strategy-matching and balanced set of competencies, boards are better equipped to meet their governance responsibilities (Leblanc & Gillies, 2005). ETG- focused boards can ask the right questions, challenge responses in relation to the businesses they govern and are much more likely to ensure that the right information makes it onto the board agenda (Andriole, 2009). Unfortunately, many boards remain in the dark when it comes to IT spending and strategy, despite corporate information assets often accounting for more than 50% of capital spending (Nolan et al. 2005). However, as suggested by Toomey (2013) the identified gap might not be as difficult to resolve as it appears. He suggests that to be effective in overseeing an organisation's use of IT, boards don't need to understand the detail of technology as much as they need to understand how management should be dealing with technology. Boards already well versed in overseeing management in respect of other resources may find the learning curve is not as steep as imagined.

CONCLUSION AND FURTHER RESEARCH

This research highlighted a significant gap in board actions to build ETG capability made more difficult by confusing technology governance definitions and no available ETG competency set for boards to use. The study revealed a strongly felt business need for boards to build ETG competency to improve their oversight of how value and returns are achieved and risk is reduced. With ETG competencies boards are better placed to lead and align strategy, comply with regulations and standards and monitor risk. They are better able to oversee technology investment decisions and derive value, as is expected of the role of board director. The results focused competency set provided was developed from an initial lens of enterprise architecture, but revised to provide a set from which boards can evaluate current competence, and develop or recruit for improved ETG competence. This paper reported the development of the board-level ETG competency set, using an established competency framework (POCCI). The mixed- method approach also used Schippmann et al's (2000) Level of Rigour Scale to provide a medium to high level of rigour during the four phase development process. This process makes a methodological contribution to competency development in the adaption of the POCCI model and in the application of a rigour scale to board-level competency development. The survey revealed strong interest in board ETG competencies, except in those older board members without IT experience or education. This requires further investigation as there were inadequate numbers of board members in this age/qualification group responding. The major contribution to practise of this research is in providing the first known ETG board level competency set situated among the nexus technologies. However, because the set applies to the generic role of board director, more work is required and is underway to rank order these competencies as perceived by a range of board members such as executive and non-executive directors and chairmen, and to test the content and distribution of the importance of each competency as a function of industry sector. Further research is also suggested to determine the relevance and differences in competency requirements both to senior non-IT executives and across other non-IT disciplines within the board. Further implications for practice include the competencies being available for board recruitment, evaluation and director professional development.

BIBLIOGRAPHY

- Ali, S., and Green, P. 2012. "Effective information technology (IT) governance mechanisms: An IT outsourcing perspective," *Information Systems Frontiers* (142), pp 179-193.
- Andriole, S. J. 2009. "Boards of directors and technology governance: the surprising state of the practice," *Communications of the Association for Information Systems* (24:1).
- Arendsdorf, B. 2012. "Board Competencies Beyond Fin Lit," *Credit Union Times*, pp n/a-12.
- Bai-Chuan, Y., Bing-Eng, W., Pei-Gi, S., and Ming-Hsien, Y. 2006. "On establishing the core competency identifying model: A value-activity and process oriented approach," *Industrial Management + Data Systems* (106), pp 60-80.
- Bart, C., and Turel, O. 2010. "IT and the Board of Directors: An Empirical Investigation into the "Governance Questions Canadian Board Members Ask about IT," *Journal of Information Systems* (24:2), pp 147-172.
- Bassellier, G., Benbasat, I., and Reich, B. H. 2003. "The Influence of Business Managers' IT Competence on Championing IT," *Information Systems Research* (14:4) December 1, 2003, pp 317-336.
- Bloch, M., Brown, B., and Sikes, J. 2012. "Elevating technology on the boardroom agenda ".

- Bryman, A., and Bell, E. 2007. *Business research methods*, (Oxford University Press, USA).
- Buckby, S., Best, P., and Stewart, J. 2010. "The Current State of Information Technology Governance Literature," in *Business Information Systems: Concepts, Methodologies, Tools and Applications*, I. R. M. A. (USA) (ed.), IGI Global: Hershey, Pennsylvania USA, pp. 1657-1705.
- Corbin, J., and Strauss, A. 2008. *Basics of qualitative research* (3rd ed.), (Sage.: Thousand Oaks, CA).
- Cragg, P., Caldeira, M., and Ward, J. 2011. "Organizational information systems competences in small and medium-sized enterprises," *Information & Management* (48:8), pp 353-363.
- De Haes, S., and Van Grembergen, W. 2012a. "Analysing the Impact of Enterprise Governance of IT Practices on Business Performance," in *Business Strategy and Applications in Enterprise IT Governance*, W. Van Grembergen and S. De Haes (eds.), IGI Global: Hershey, Pennsylvania, USA, pp. 14-36.
- Eisener-Ampler 2012. "Concerns about risks confronting boards: third annual board of directors survey 2012," Eisener Ampler, NY, NY, USA.
- Fox, N., Ward, K., and O'Rourke, A. 2006. "A Sociology of Technology Governance for the Information Age: The Case of Pharmaceuticals, Consumer Advertising and the Internet," *Sociology* (40:2) April 1, 2006, pp 315-334.
- Groysberg, B., and Bell, D. 2012. "2012 Board of directors survey," Heidrick & Struggles International, Inc. and WomenCorporateDirectors WCD), USA.
- Harvey, D. Year. "Law, information and technology," New Zealand Law Society Technology Law Conference, The IT Country Justice,, Auckland, NZ, 2013.
- Ho, J. L. Y., Wu, A., and Xu, S. X. 2011. "Corporate Governance and Returns on Information Technology Investment: Evidence from Emerging Market," *Strategic Management Journal* (32:6) Jun, pp 595-623.
- Hoogervorst, J. A. P. 2009. "Enterprise Governance and Enterprise Engineering," Springer Berlin Heidelberg: Dordrecht.
- Huff, S. L., Maher, M. P., and Munro, M. C. 2006. "Information technology and the board of directors: is there an IT attention deficit?," *MIS Quarterly Executive* (5:2) June 2006, pp 55 – 68.
- IEAD 2011. "Enterprise architecture," Institute for Enterprise Architecture Developments.
- ISO/IEC 2008. "ISO/IEC 38500:2008, Corporate Governance of information technology," International Organization for Standardization, : Switzerland.
- ITGI 2011. "Global status report on the governance of enterprise IT (GEIT) - 2011," IT Governance Institute, Rolling Meadows, IL.
- Jewer, J., and McKay, K. N. 2012. "Antecedents and consequences of board IT governance: institutional and strategic choice perspectives," *Journal of the Association for Information Systems* (13:7), pp 581-617.
- Keller, D., Berlin, B., and Strott, E. 2012. "Directors and IT: what works best," PwC: Centre for Board Governance.
- Ko, D., and Fink, D. 2010. "Information technology governance: an evaluation of the theory-practice gap," *Corporate Governance* (10:5), pp 662-674.
- Leblanc, R., and Gillies, J. 2005. *Inside the Boardroom.*, (Wiley & Sons: Ontario).
- Libert, L. 2013. "Why boards must embrace big data," in *Directorship: Boardroom Intelligence*, National Association of Corporate Directors: Washington DC.
- Luftman, J. N., Ben-Zvi, T., Dwivedi, R., and Rigoni, E. H. 2012. "IT Governance: An Alignment Maturity Perspective," in *Business Strategy and Applications in Enterprise IT Governance*, W. Van Grembergen and S. De Haes (eds.), IGI Global: Hershey, PA, USA, pp. 87-101.
- Marchand, D. A. 2005. "Reaping the business value of IT," in *Business and Economic Review: Columbia, United States*, Columbia, pp. 21-24.
- Markus, L. H., Cooper-Thomas, H. D., and Allpress, K. N. 2005. "Confounded by Competencies? An Evaluation of the Evolution and Use of Competency Models," *New Zealand Journal of Psychology* (34:2), pp 117-126.
- Marrelli, A. F. 1998. "An introduction to competency analysis and modeling," *Performance Improvement* (37:5), pp 8-17.

- Martyn, K. 2006. *Decision-making in a corporate boardroom: Inside the black box*, doctoral thesis, Massey University, Wellington New Zealand.
- Masli, A., Richardson, V. J., Sanchez, J. M., and Smith, R. E. 2011. "The Business Value of IT: A Synthesis and Framework of Archival Research," *Journal of Information Systems* (25:2), pp 81-116.
- Mithas, S., Tafti, A., Bardhan, I., and Mein Goh, J. 2012. "Information Technology and Firm Profitability: Mechanisms and Empirical Evidence," *MIS Quarterly* (36:1), pp 205-224.
- Nolan, R., and McFarlan, F. W. 2005. "Information technology and the board of directors," *Harvard Business Review* (83:10), pp 96-106.
- Parent, M., and Reich, B. H. 2009. "Governing information technology risk," *California Management Review* (51:3) Spring2009, pp 134-152.
- Pérez-López, S., and Alegre, J. 2012. "Information technology competency, knowledge processes and firm performance," *Industrial Management + Data Systems* (112:4), pp 644-662.
- PwC 2012. "Annual Corporate Director Survey," Price Waterhouse Coopers New York, USA.
- PwC 2012a. "Bridging the IT confidence gap (abridged version)," PriceWaterhouseCoopers, New York, USA.
- Rheingold, H. 2012. *Net smart : how to thrive online*, (MIT Press: Cambridge, MA, USA).
- Schippmann, J. S., Ash, R. A., Carr, L., and Hesketh, B. 2000. "The practice of competency modeling," *Personnel Psychology* (53:3), pp 703-740.
- Scott, P. R., and Jacka, J. M. 2011. "Auditing social media: A governance and risk guide ", Wiley: Hoboken, N.J.
- SFIA Foundation 2011. "SFIA 5 framework reference," in *Skills for the Information Age*, SFIA Foundation: UK, pp. 1-45.
- Tallon, P. P. 2008. "Inside the adaptive enterprise: an information technology capabilities perspective on business process agility," *Information Technology & Management* (9:1) Mar, pp 21-36.
- Toomey, M. 2013. "LinkedIn Discussion thread 'Do boards know enough about technology to ask the right questions?'," Boards and Advisors Group.
- Valentine, E., and Stewart, G. 2013. "The emerging role of the board of directors in enterprise business technology governance," *International Journal of Disclosure and Governance*:April, pp 1-17.
- Van Grembergen, W., and De Haes, S. 2009a. "Enterprise Governance of IT in Practice: Enterprise Governance of Information Technology," Springer US, pp. 21-75.
- Van Grembergen, W., and De Haes, S. 2009b. *Enterprise Governance of IT: Achieving Strategic Alignment and Value*, (Springer: New York
- Van Grembergen, W., and De Haes, S. 2009c. "The IT Balanced Scorecard as a Framework for Enterprise Governance of IT " in *Enterprise Governance of Information Technology: Achieving Strategic Alignment and Value*, W. Van Grembergen and S. De Haes (eds.), Springer: Boston, MA, USA, pp. 111-136.
- Van Grembergen, W., and De Haes, S. 2012. "A Research Journey into Enterprise Governance of IT, Business/IT Alignment and Value Creation," in *Business Strategy and Applications in Enterprise IT Governance*, W. Van Grembergen and S. De Haes (eds.), IGI Global: Hershey, PA, USA, pp. 1-13.
- Yin, R. K. 2009. *Case study research: design and methods*, (4th ed.) Sage: Thousand Oaks, CA.
- Yusoff, W. F. W., and Armstrong, A. 2012. "What Competencies Should Directors Possess? Malaysia Perspective," *International Journal of Business and Management* (7:2), pp 142-149.

COPYRIGHT

Elizabeth Valentine and Glenn Stewart © 2013. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.